REMARKS

This communication responds to the Office Action dated December 8, 2008.

Claims 1, 15, 22-24, 27, 30-31, 33-36 are amended, claims 8-14, 19, 25, 28, and 29 are canceled; as a result, claims 1-7, 15-18, 22-24, 26-27, 30-31, and 33-36 are now pending in this application.

Objections to the Drawings

The drawings were objected to for failing to show a "first factor matrix," "second factor matrix," a "third factor matrix," "subframe," and "first and second weights." Applicant respectfully submits that these features are indeed shown in the drawings. Applicant respectfully submits that the drawings are in compliance with 37 C.F.R. § 1.83(a).

Page 9 last paragraph of the Specification refers to matrix factorising that comprises singular value decompensation (SVD) into three factor matrices. In regard to Figure 9a, the Specification on page 33 last paragraph refers to SVD of a matrix I. First to third matrices are shown in Figure 9A.

In regard to subframe, page 7 second full paragraph of the specification refers to "factorising the image matrix into at least two factor matrices defining row and column drive signals for the display." Page 8 first paragraph refers to driving "the display with successive sets of row and column signals to build up a displayed image, each set of signals defining a subframe of the displayed image." Page 32 fifth paragraph states that Figure 8b shows row R, column C, and image I matrices for a multiline addressing scheme. Page 34 third full paragraph states that the image in Figure 12 is defined by a 50x50 sub image matrix which ... is displayed using 15 subframes," and row R, column C, and image I matrices are shown in Figure 12. Thus, Applicant respectfully submits that the subframe feature is shown in the drawings.

In regard to weights, page 10 first paragraph states that the diagonal elements of the third matrix effectively define a weight for the first and second factor matrices. This is shown in the matrix multiplication of the several equations on pages 18-23 of the Specification. It is not evident why the Office would require these matrix elements to be shown in both the equations

and the drawings, but diagonal elements of a matrix are shown in Figure 12 in the third matrix

Iref. Thus, Applicant respectfully submits that the weights feature is shown in the drawings.

In sum, a "first factor matrix," "second factor matrix," a "third factor matrix,"

"subframe," and "first and second weights" are shown, and the drawings are in compliance with

37 C.F.R. § 1.83(a). Withdrawal of the objection to the drawings is respectfully requested.

Objections to the Specification

1.   The Specification was objected to because the specification lacks section headings for the

content of the specification. The Specification is amended as shown above to add headings.

Withdrawal of the objection to the Specification is respectfully requested.

2.   The Abstract was objected to because the Abstract repeats information given in the title

and includes terms such as "said." The Abstract is amended to include the changes required by

the Office. Withdrawal of the objection to the Abstract is respectfully requested.

3.   The Disclosure was objected to because it contains an embedded hyperlink and/or other

form of browser-executable code on page 24 of the specification. The Specification is amended

to remove the hyperlink. Withdrawal of the objection to the Specification is respectfully

requested.

4.   The Disclosure was objected to because of the following informalities: the applicant fails

to differentiate the term "frame" and "subframe" and to provide structural relations or

differences of the two terminologies. Applicant respectfully submits that the differences

between frame and subframe are clear in the Specification.

Page 12 first full paragraph of the Specification refers to bright areas of a display that

may change from frame to frame. Page 8 first paragraph refers to "subframes combining to

define a complete desired image" and states that a "subframe may refer to a portion of the

desired displayed image in either time and/or space". The Specification also refers to (page 9

first paragraph) limiting the number of subframes such that the same image data is displayed

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with the same overall frame period. Thus, in the Specification a subframe may be a portion of a frame, and the relation between frame and subframe is clear.

Accordingly, withdrawal of the objection to the Disclosure is respectfully requested.

5. The Disclosure was objected to because of the following informalities: the applicant fails to define the diagonal matrix or Y matrix because on page 20 of the specification [it is stated] "Format Y as a diagonal matrix," but on Page 19 of the specification the Y matrix is clearly a column matrix. Applicant respectfully submits that the difference between the Y matrix and the diagonal matrix is clear.

Page 19 of the Specification shows that the Y matrix is a column matrix. Page 20 of the Specification indicates that matrix W may be a diagonal equivalent of the Y matrix $(W:=diag(Y))$. In other words, Y may be transformed from a column matrix into a diagonal matrix in order to obtain W.

Therefore the relationship between a diagonal matrix and the Y matrix is clear. Accordingly, withdrawal of the objection to the Disclosure is respectfully requested.

Objections to the Claims

1. Claims 1, 22, and 23 were objected to because "a" was missing in reference to some elements. Claims 1, 22, and 23 were changed to include the missing "a"s. Withdrawal of the objection and allowance of the claims is respectfully requested.

§ 112 Rejection of the Claims

1. Claim 27 was rejected under 35 U.S.C. § 112, first paragraph, as lacking adequate description or enablement for "more than one subframe drives a said pixel data." Claim 27 was amended to clarify the present subject matter.

Applicant traverses the rejection as applied to claim 27 in its present form. Claim 27 presently recites "more than one said subframe enables driving a pixel of said display". Applicant respectfully submits that the Specification is enabling at least through the several descriptions throughout the Specification to multi-line addressing and subframes for

simultaneous driving of a plurality of row electrodes and a plurality of column electrodes. Withdrawal of the rejection and allowance of claim 27 is respectfully requested.

2.   Claims 1-20, 23, 27, 30, and 35 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicant traverses the rejection as applied to these claims in their present form.

Claim 17 was rejected because of insufficient antecedent basis for "first and second weights". Claim 17 depends on claim 16, which depends on independent claim 1. Applicant respectfully submits that no antecedence is apparently required because first and second weights are not mentioned in claims 1 and 16. Withdrawal of the rejection and allowance of claim 17 is respectfully requested.

Claims 15 and 30 were rejected because the limitation mxn, mxp, pxn, I, W, and H fails to expressly define the selected terms in the claim language. Regarding this rejection, Applicant is unsure of the concern of the Office because the definition of terms in the claims do not have to be stated in the claims themselves. Applicant also notes that the Office Action on page 23 uses the term bxa to describe a matrix presumably because the meaning of bxa is clear. Nonetheless, Applicant has amended the claims to clarify that an $m \times n$ matrix is an m row by n column matrix, an $m \times p$ matrix is an m row by p column matrix, a $p \times n$ matrix is an p row by n column matrix, that I is an $m \times n$ matrix, W is an $m \times p$ matrix, and H is a $p \times n$ matrix. Withdrawal of the rejection and allowance of claims 15 and 30 is respectfully requested.

Claim 27 was rejected because of insufficient antecedent basis for "a said pixel data". Claim 27 was amended to clarify the present subject matter and resolve the antecedence issue. Withdrawal of the rejection and allowance of claim 27 is respectfully requested.

Claims 23, 30, and 35 were rejected because of insufficient antecedent basis for "said first and second factor matrices." These claims were amended to resolve the antecedence issue. Withdrawal of the rejection and allowance of these claims is respectfully requested.

Claims 1-20 were rejected under 35 U.S.C. § 112, second paragraph, as being incomplete for omitting the structural relationships of the first factor matrix, the second factor matrix, a third factor matrix, subframe, and first and second weights. Claims 1 and 15 are amended and claims 8-14 and 19-20 are canceled. Applicant respectfully traverses the rejection as applied to the claims in their present form.

Regarding the relationship between the first factor matrix and the second factor matrix, claim 1 specifies that an image matrix is factorised into a product of the first factor matrix and the second factor matrix, wherein the first factor matrix defines row drive signals for the display and the second factor matrix defines column drive signals for the display. Thus, Applicant respectfully submits that the relationship between the first factor matrix and the second factor matrix is clear.

Regarding the third factor matrix, claims 8-10 which refer to the third matrix were canceled.

Regarding the relationship of subframe to the first factor matrix and the second factor matrix, claim 1 states that the first factor matrix defines row drive signals for the display and the second factor matrix defines column drive signals for the display. Claim 3 states that each said set of [row and column] signals defines a subframe of said display image. Thus, Applicant respectfully submits that the relationship between the first factor matrix, the second factor matrix, and the subframe is clear.

Regarding the relationship of first and second weights to the first factor matrix and the second factor matrix, claim 16 recites that image matrix factorising includes weighting said ... colour channel with a greater weight ... such that said ... colour channel is displayed ... more accurately. Additionally, claim 17 recites "scaling ... said green and second colours by respective first and second weights," linking the first and second weights to the colour channels of the display. Thus, Applicant respectfully submits that the relationship between the first factor matrix, the second factor matrix, the first and second weights, and the display is clear.

Withdrawal of the rejection and allowance of claims 1-7 and 15-18 is respectfully requested.

§ 101 Rejection of the Claims

Claims 22 and 23 were rejected under 35 U.S.C. § 101, because the claimed invention is directed to non-statutory subject matter because the preamble includes "a carrier carrying processor control code."

Regarding claim 22, the Specification was amended to remove the reference to an electronic signal carrier.

Regarding claim 23, the preamble of the claim presently includes "[a] driver for an emissive display", and does not include a carrier.

Withdrawal of the rejection and allowance of claims 22 and 23 is respectfully requested.

§ 102 Rejection of the Claims

Claims 1-2, 7, 19-20, 22, 23, and 35 were rejected under 35 U.S.C. § 102(b) as being anticipated over Routley (GBP 85906). Claims 1, 22, 23, and 35 are amended to clarify the present subject matter. Applicant respectfully traverses the rejection as applied to the claims in their present form and submits that a proper *prima facie* showing of anticipation has not been established for these claims because Routely does not teach each and every element of these claims.

Routley relates to driver display circuits where individual components are addressed by activating row (or column) lines, for example by use of an x-driver and a y-driver such as shown in FIG. 3 and described in ¶ 0015.

Applicant cannot find in Routley any teaching of, among other things,

factorising said image matrix into a product of at least a first factor matrix and a second factor matrix, said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display,

as recited in claim 1 and similarly recited in claims 22, 23, 35.

In Routley, the matrix OLED display uses n row lines and m column lines (*see,* ¶0015). Individual elements are activated by setting a column drive and selectively connecting the row lines to ground (*see,* ¶0058). A two dimensional image may be presented on display by selecting each row in turn and driving all the pixels in the selected row using column drivers, then selecting the next row and repeating the process to build up an image using conventional raster

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scan pattern (see, ¶0058). Thus, Routley does not teach factorising an image matrix into a product of at least a first factor matrix and a second factor matrix, but instead uses conventional raster scan.

The Office Action states that a passive matrix (b x a) is always compiled of a (b x n) row matrix and a (n x a) column matrix (n being an integer greater than 1). Therefore, the limitation is inherent within the disclosure (of Routely). Applicant respectfully disagrees with the assertion of inherency.

The Office Action has not established a *prima facie* case of inherency because, as recited in MPEP § 2112, "In relying upon the theory of inherency, the examiner must provide basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic <u>necessarily</u> flows from the teachings of the applied prior art," citing <u>Ex parte Levy</u>, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). The Office Action states that a passive matrix (b x a) is always compiled of a (b x n) row matrix and a (n x a) column matrix. Applicant respectfully submits that factorising an image matrix into a product of first and second factor matrices does not necessarily flow from Routely because Routely describes a single *m* x *n* matrix. Thus, as evidenced by Routley, a passive matrix (b x a) is not always compiled of a (b x n) row matrix and a (n x a) column matrix, and a proper *prima facie* case of inherency has not been established.

Additionally, Routley does not teach or even suggest "wherein said factorising comprises non-negative matrix factorization (NMF)," as presently recited in claims 1 and 22, or where the factorising comprises "all the elements of said first and second matrices [being] equal to or greater than zero," as presently recited in claims 23 and 35.

Therefore, Applicant respectfully requests withdrawal of the rejection and allowance of claims 1-2, 7, 19-20, 22, 23, and 35.

§ *103 Rejection of the Claims*

1.   Claims 3, 6, 24-25, 27, 31, 33, 34, and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Nagaoka et al. (U.S. Patent No. 5,874,932, hereinafter "Nagaoka"). Claims 24, 33, 34, and 36 are amended to clarify the present subject matter. Applicant respectfully traverses the rejection as applied to the claims in their

present form, and submits that a proper *prima facie* showing of obviousness has not been

established for these claims because Routley, Nagoaka, together with the reasoning of the Office

Action do not teach or suggest all of the elements of these claims.

Claims 3 and 6 ultimately depend on base claim 1. As set forth above, Routely fails to

teach or even suggest all of the elements recited in claim 1 and incorporated into claims 3 and 6.

Nagoaka fails to teach or suggest the missing elements. For example, Applicant cannot find in

Routley or Nagoaka either separately or in combination, any teaching or suggestion of, among

other things,

> factorising said image matrix into a product of at least a first factor matrix and a
> second factor matrix, said first factor matrix defining row drive signals for said
> display, said second factor matrix defining column drive signals for said display,

as incorporated into claims 3 and 6 from claim 1.

Regarding claims 24-25, 27, 31, 33, 34, and 36, Applicant cannot find in the proposed

combination of Routley and Nagoaka and teaching or suggestion of ·

> formatting said image data into a plurality of subframes, each said subframe
> comprising data for driving a plurality of said row electrodes simultaneously with
> a plurality of said column electrodes; and driving said row and column electrodes
> with said subframe data, wherein said subframe data driving said row and column
> electrodes comprises only positive or zero data,

as presently recited in claim 24 and similarly recited in claims 33, 34, and 36.

The Office Action concedes that Routely fails to disclose combining subframes to

compose the said image, but that Nagaoka discloses a picture of a frame is displayed on a plasma

display device by combining a plurality of suibframes (*see,* Office Action, pg. 25). However, in

Nagoaka, the subframes have different degrees of brightness and include periods such as self-

erasing, address, sustain discharge, and quiescent periods (*see,* Abstract and Fig. 15). Thus,

Nagoaka is primarily concerned with the provision of the above time periods in a subframe in

order to reduce half tone noise, and does not teach or suggest using subframes to implement the

sequence of activating row and column electrodes according to image data.

Moreover, in Nagoaka an address discharge is carried out in the *order of lines* to turn the

cells on and off (*see,* col. 3 lines 36-38, emphasis added). Nagoaka also states that 'the same

operation is carried out *successively* for all other display lines, and the display data are newly

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written in all of the display lines" (*see,* col. 3 lines 56-58, emphasis added). On this basis, Nagoaka apparently implements a technique similar to a conventional raster scan, and thus Nagoaka with Routely fails to teach or suggest subframes comprising data for driving a plurality of row electrodes *simultaneously* with a plurality of said column electrodes.

Further, Applicant cannot find any teaching or suggestion of

wherein said formatting comprises compressing said image data into said plurality of subframes, and wherein said compressing comprises non-negative matrix factorisation (NMF)

as presently similarly recited in claims 24 and 33.

The Office Action states that both Routley and Nagoaka fail to disclose a non-negative factorization, but that Franz et al. (U.S. Publication No. 2003/0018604, "Franz") discloses a matrix comprising non-negative matrix factorization for a system to use less memory. However, one of ordinary skill in the art of display driving would not reasonably be led to combine Routley or Nagoaka with Franz.

Franz relates to a method of indexing a data base of documents (*see,* Abstract) rather than display driving, and a desire for less memory use for a data base would not be a motivation of one of ordinary skill in the art of display driving. Franz concerns the problem of large memory capacity requirements for indexing a document database, which may be particularly high where two-pass indexing is implemented (*see,* ¶0007). In contrast to document database indexing applications, a display driver generally requires a frame memory (*see, e.g.,* Fig. 5, 504 of Routely) of predetermined size corresponding to the size of the image, and one or more bits of memory is associated with each pixel (*see,* Routley ¶0061). Consequently, one of ordinary skill in the art of display driving would not reasonably led to implement the database indexing system of Franz in a display driver when taking into account the increase in processing required, working memory, and program memory that may be necessary.

The Office Action states that it would have been obvious for one of ordinary skill in the art to combine the display matrix system of Routely with the compression method of Nagoaka with the non-negative matrix factorization of Franz to limit the storage requirement for the image data of every interaction, because this will allow the display to function much quicker. However, there is no disclosure that the NMF as implemented in Franz leads to any increase in speed.

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Franz focuses entirely on reducing memory storage. Therefore, one of ordinary skill would not reasonably be led to combine Routley or Nagoaka with Franz. Furthermore, if speed was a motivation, one of ordinary skill would be led away from implementing the subframe formatting due to the additional processing requirements.

In sum, the proposed combination of Routley with Nagoaka fails to teach or suggest all of the elements presently recited in the claims, and the addition of Franz fails to teach or suggest the missing elements. Consequently, Applicant respectfully requests withdrawal of the rejection and allowance of claims 3, 6, 24-25, 27, 31, 33, 34, and 36.

2. Claims 4-5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Nagoaka et al. (U.S. Patent No. 5,874,932) and Huang (U.S. Publication No. 2001/0045924 A1). Applicant respectfully traverses the rejection and submits that a proper *prima facie* showing of obviousness has not been established for these claims because Routley, Nagoaka and Huang, together with the reasoning of the Office Action do not teach or suggest all of the elements of these claims.

Claims 4 and 5 ultimately depend on base claim 1. As set forth above, Routely fails to teach or even suggest all of the elements recited in claim 1 and incorporated into claims 4 and 5. Nagoaka and Huang fail to teach or suggest the missing elements. For example, Applicant cannot find in Routley, Nagoaka and Huang, either separately or in combination, any teaching or suggestion of, among other things,

> factorising said image matrix into a product of at least a first factor matrix and a second factor matrix, said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display,

as incorporated into claims 4 and 5 from claim 1.

Applicant respectfully requests withdrawal of the rejection and allowance of claims 4 and 5.

3. Claim 26 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley in view of Nagoaka and Perry et al. (U.S. Patent No. 6,832,729, "Perry"). Applicant respectfully traverses the rejection and submits that a proper *prima facie* showing of obviousness has not

been established for claim 26 because Routley, Nagoaka and Perry, together with the reasoning

of the Office Action do not teach or suggest all of the elements of the claim.

Claim 26 depends on claim 24. As set forth above, Applicant believes claim 24 to be

allowable at least because Routley and Nagoaka fail to teach or suggest every element recited in

claim 24 and incorporated into claim 26. Perry fails to teach or suggest the missing elements.

For example, Applicant cannot find in the cited portions of Routley, Nagoaka and Perry any

teaching or suggestion of

> formatting said image data into a plurality of subframes, each said subframe
> comprising data for driving a plurality of said row electrodes simultaneously with
> a plurality of said column electrodes; and driving said row and column electrodes
> with said subframe data, wherein said subframe data driving said row and column
> electrodes comprises only positive or zero data,

as presently recited in claim 24 and incorporated into claim 26. Applicant respectfully requests

reconsideration and allowance of claim 26.

4.   Claim 28 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley

(GBP 85906) in view of Nagaoka et al. (U.S. Patent No. 5,874,932) and Pope (U.S. Publication

No. 2003/0189579 A1). Claim 28 is canceled.

5.   Claims 29-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley

(GBP 85906) in view of Nagaoka et al. (U.S. Patent No. 5,874,932) and Franz et al. (U.S.

Publication No. 2003/0018604 A1). Claim 24 was rewritten to incorporate elements of claim 29,

and claim 29 is canceled. Applicant respectfully traverses the rejection as applied to claim 30

and submits that a proper *prima facie* showing of obviousness has not been established for this

claim because Routley, Nagoaka and Franz, together with the reasoning of the Office Action do

not teach or suggest all of the elements of the claim.

Claim 30 depends on base claim 24, As set forth above, Applicant believes claim 24 to be

allowable at least because Routley and Nagoaka fail to teach or suggest every element recited in

claim 24 and incorporated into claim 30. Franz fails to teach or suggest the missing elements.

For example, Applicant cannot find in the cited portions of Routley, Nagoaka and Franz any

teaching or suggestion of

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formatting said image data into a plurality of subframes, each said subframe comprising data for driving a plurality of said row electrodes simultaneously with a plurality of said column electrodes; and driving said row and column electrodes with said subframe data, wherein said subframe data driving said row and column electrodes comprises only positive or zero data,

as presently recited in claim 24 and incorporated into claim 30. Additionally, as set forth in item 1 above, one of ordinary skill in the art would not reasonably be led to combine Franz with Routely and Nagoaka. Applicant respectfully requests reconsideration and allowance of claim 30.

6.   Claims 8-9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Pope (U.S. Publication No. 2003/0189579 A1). Claims 8 and 9 are canceled.

7.   Claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Pope (U.S. Publication No. 2003/0189579 A1) and Imoto et al. (U.S. Patent No. 5,886,755). Claim 10 is canceled.

8.   Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Pope (U.S. Publication No. 2003/0189579 A1) and Satake (U.S. Publication No. 20020075216 A1). Claim 11 is canceled.

9.   Claims 12-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Jamali (U.S. Patent No. 6,678,319). Claims 12 and 13 are canceled.

10.   Claims 14-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Franz (U.S. Publication No. 2003/0018604 A1). Claim 14 is canceled. Applicant respectfully traverses the rejection as applied to claim 15, and submits that a proper *prima facie* showing of obviousness has not been established for this claim because Routley, Franz, together with the reasoning of the Office Action do not teach or suggest all of the elements of claim 15.

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Claim 15 depends on base claim 1. As set forth above, Routely fails to teach or even suggest all of the elements recited in claim 1 and incorporated into claim 15. Franz fails to teach or suggest the missing elements. For example, Applicant cannot find in the cited portions of Routley or Franz either separately or in combination, any teaching or suggestion of, among other things,

> factorising said image matrix into a product of at least a first factor matrix and a second factor matrix, said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display,

as incorporated into claim 15 from claim 1. Additionally, as set forth above in item 1, one of ordinary skill would not reasonably be led to combine Routely with Franz. Consequently, Applicant respectfully requests withdrawal of the rejection and allowance of claim 15.

11.   Claims 16-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Routley (GBP 85906) in view of Perry (U.S. Patent No. 6,832,729). Applicant respectfully traverses the rejection and submits that a proper *prima facie* showing of obviousness has not been established for these claims because Routley and Perry, together with the reasoning of the Office Action do not teach or suggest all of the elements of these claims.

Claims 16, 17, and 18 ultimately depend on base claim 1. As set forth above, Routely fails to teach or even suggest all of the elements recited in claim 1 and incorporated into claims 16 and 18. Perry fails to teach or suggest the missing elements. For example, Applicant cannot find in Routley and Perry, either separately or in combination, any teaching or suggestion of, among other things,

> factorising said image matrix into a product of at least a first factor matrix and a second factor matrix, said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display,

as incorporated into claims 16, 17, and 18 from claim 1.

Applicant respectfully requests withdrawal of the rejection and allowance of claims 16 - 18.

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CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's representative at (612) 371-2172 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

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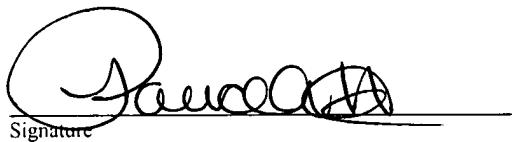Minneapolis, MN 55402
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